



Research Article

TURNAROUND TIME OF ANALYSES RESULTS REQUESTED IN EMERGENCIES IN PARACLINICAL TRAINING AND BIOCHEMISTRY RESEARCH UNIT OF THE JOSEPH RAVOAHANGY ANDRIANAVALONA UNIVERSITY HOSPITAL CENTER

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ABSTRACT

The Turnaround time of analyses results is defined as the delay from biological prescription to the results delivery. The medical decision often depends on the results of biological tests. The purpose of this study is to analyse quantitatively the delay of the results delivery period of the biochemical tests which are urgently requested. It is a prospective and descriptive study on a period of a whole week done in Paraclinical Training and Biochemistry Research Unit of the Joseph Ravoahangy Andrianavalona University Hospital Center during the period of the on- call duty. A total of 129 files were recorded. The delay of the delivery of average results is 295 minutes with extremes of 35 and 368 minutes. The majority of requests contains 3 parameters per request. Many causes of the delay of the results are identified in this study such as the lack of staff in care services and at the laboratory, a long analysis circuit, the absence of automation of the pre and post analytic stages within our laboratory.

KEYWORDS :- Turnaround time of analyses results, urgent biochemical parameters, period of on-call duty.

INTRODUCTION

The Turnaround time of analyses results is defined as the period between the prescription of the biological tests and the delivery of the results [1].

The medical decision, such as medical and chirurgical care or the initiation therapy, often depends on the results of biological tests. Therefore it is very important for the

clinician to get as quickly as possible the report of laboratory tests in order to decrease the length of hospital stay of the patient [2].

It is a part of indicators that measure the quality and operation of all the analytical process and consequently reflect the performance of a laboratory [3].

The main responsibilities of a laboratory are not only to provide reliable and exact results but also to provide the results in time for an adequate care [4].

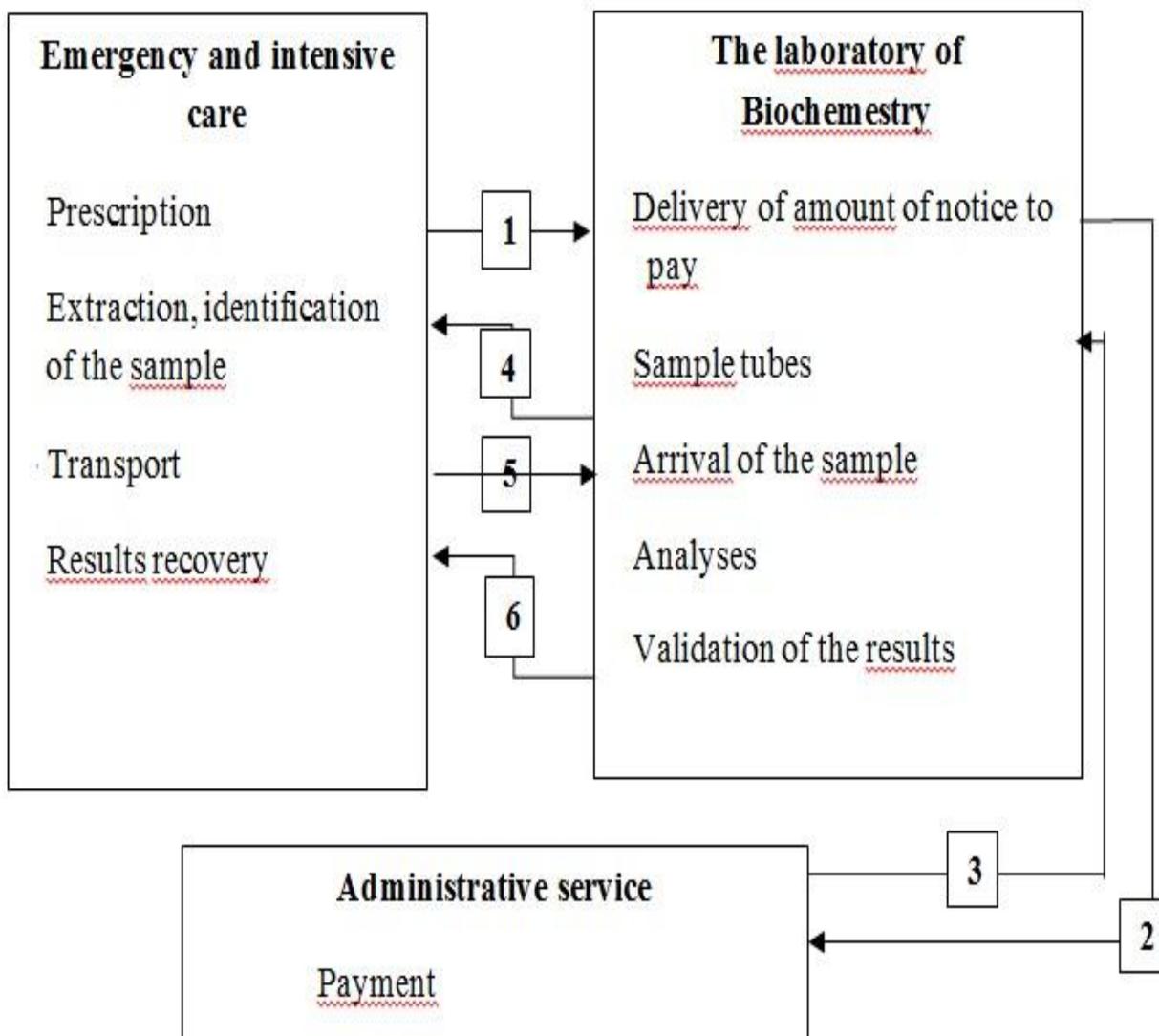


The purpose of this study is to evaluate quantitatively the delivery period of the results of biochemical tests urgently requested, to determine the causes of the delay of the delivery period of the results.

MATERIALS AND METHODS

This is a descriptive and prospective study recovering a period of a whole week from 22nd December to 28th December 2017, performed in Paraclinical Training and Biochemistry Research Unit of the Joseph Ravoahangy Andrianavalona University Hospital Center during the period of the on-call duty. This period went from 5:00 pm to 8:00 am on working days and it lasted 24 hours at the weekends and on holidays. In this study were included all the requests of prescribed tests during the period of the on-call duty. Incomplete and non-compliant files were excluded. The service works 24h/24. The laboratory is located at 150 meters from the emergency department within the hospital. In the period of the on-call duty the laboratory is ensured by an intern in medical biology. Emergency organization and circuit tests in on-call duty were summarized in picture 1.

Picture 1: Scheme of biochemical analysis system during the period of the on-call duty



All the biochemical parameters were tested on the BS300 biochemical test except troponin which was tested on VIDAS® Biomerieux semi automaton. The studied parameters were the emergency biological ones which have been carried out during the on-call duty (the chemistry panel, glycemia, serum creatinine, transaminases, total and conjugated bilirubin, CRP (C-reactive protein), total protein, albuminemia, total calcemia, amylasemia, lipasemia and troponin), fractions of the delay of delivery reports, the number of the biochemical tests requests in emergency department and the analyses costs. In this study, the total turnaround time of analyses results was collected by the period between the prescription and the recovery of results at the laboratory. There was no system of computer assisted prescription. We had to collect several schedules in order to trace the path from the prescription of the biological tests to the acknowledgement of the results. In order to achieve it, 3 elements have been used :

- 1)- The sheet of an emergency request of a biochemical analysis to collect the date and the time of prescription, the time when the payment has been made, the date and the time of the sample arrival at the laboratory (Picture 2).

Picture 2 :- The sheet of an emergency request of a biochemical analysis.

PRESCRIPTION	PATIENT IDENTITY	AMOUNT OF NOTICE PAY AND PAYMENT RECEIPT	EXTRACTION	SAMPLE RECEIPT AT THE LABORATORY
-Prescriber service : -Prescriber identity : -Date and hour of the prescription :	-Name : -Surname(s) : -Gender : -Date of birth : -Bed No. : -Room No. : -Record No.: -Clinical information :	-Date and time at the emergency session service : -Amount of Notice pay No. : -Receipt of payment No. :	-Sample identity : -Date and hour of sampling : -Incidents during the sampling :	-Date and hour of the arrival at the laboratory : -The plasma aspect
STANDARD SHEETS Urea Creatinine Uric Acid Blood Ionogram Chlorine Potassium Sodium Blood glucose Postprandial Blood glucose	HEPATIC WORKUP AND/OR BILE BALANCES Bilirubin Total Bilirubin Conjugated Bilirubin Transaminases OTHER ENZYMES Lactico-Deshydrogénase (LDH) Amylase Lipase	CARDIAC MARKER Ultrasensitive cardiac Troponin I Total Proteins Albumin Total calcium Phosphorus SPECIFIC PROTEINS C-Reactive Protein (CRP) PUNCTURE LIQUID Aspect..... Glucose Chloride Proteins		
Date and hour of the delivery period of the results :				

2)- The dashboard of the automatons allowing the recording the arrival time of the sample on the automaton and the time required to perform the analysis.

3)- The register allowing to precise the arrival time and the retrieval time at the laboratory. The delay of the delivery period of the results is divided into 5 times:

- a. The delay of the prescription : it is the time which goes from the prescription of biochemical tests to the payment at the transfer service.
- b. The delay of sample : it is the time which goes from the recovery of the sampling tube at the laboratory to the arrival at the care unit for the samples collecting.
- c. The delay of transportation : it is the time between the collecting itself and the reception of the samples at the laboratory.
- d. The delay of the analysis corresponding to the analytical phase, that is to say the realization of the analysis on the automaton.
- e. The delay of the delivery period of the results corresponds to the post analytical phase : it is the time between the validation of the results and the retrieval of results at the laboratory. The data have been entered in Excel® and



processed with software Epi Info 0.7[®]. For ethical imperatives, the authorization of the persons in charge of the establishment have been got before collecting the data.

RESULTS

A total of 129 cases were recorded. The average delivery time is 295 minutes with extremes of 35 minutes and 368 minutes (table I)

Table I :-Period by fraction.

	Average	Extreme (minutes)	
	(minutes)	Minima	Maxima
The delay of prescription	188	14	300
The delay of sample	12	3	54
The delay of transportation	8	4	102
The delay of analysis	62	22	78
The delay of the delivery period of the results	25	11	189

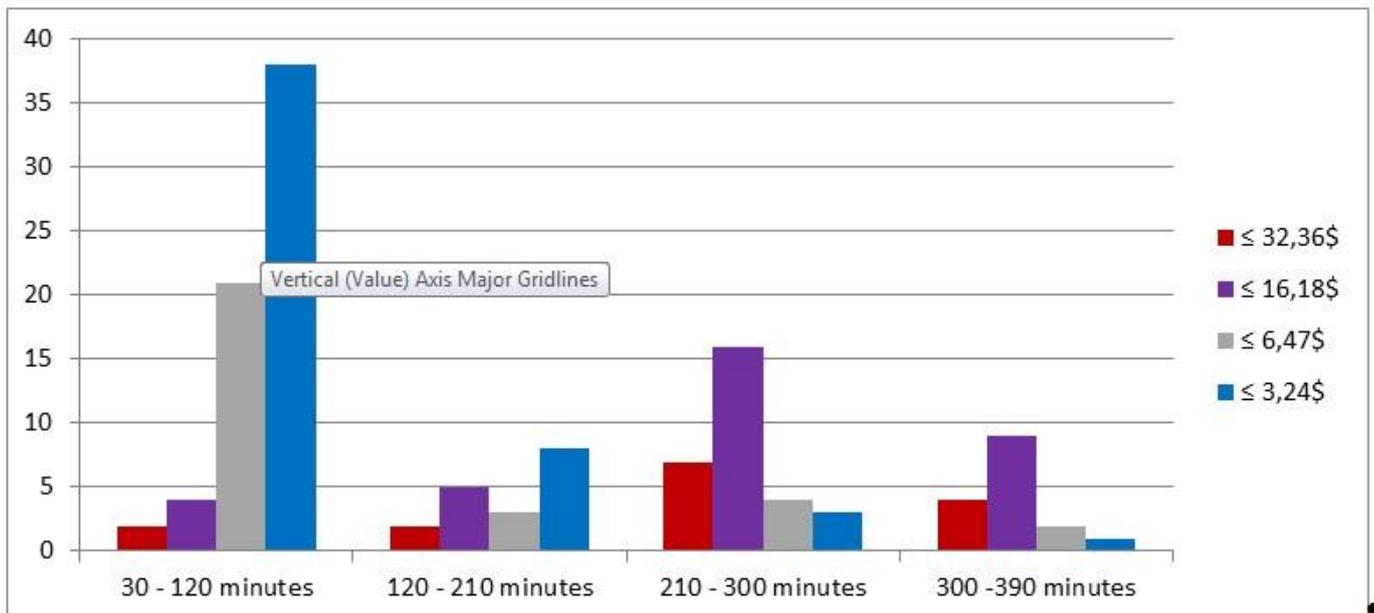
Most of the analyses requests included 1 to 4 biochemical parameters, 3 parameters per request was the average number (table II).

Table II :- Number of biochemical parameters urgently required.

	Number	Percentage (%)
n= 1- 4	88	68
n= 5 - 9	41	32
Total	129	100

Half of the prescribed statement has been established within 30 to 120 minutes. The tests that cost between ≤ 3,24 \$ and ≤ 6,47 \$ were predominant in this group. The tests that cost between ≤16,18 \$ and ≤ 32,36 \$ were predominant in the group of 210 to 390 minutes (picture 3).

Picture 3:- The delivery period of the results compared to the analysis cost.



DISCUSSION

The laboratory take a leading role in the diagnosis and the treatment of the patients. The average delivery period of the results is 295 minutes. Beltramini et al mentioned an estimated waiting time of the analysis results at 105 minutes [5]. This long period at our laboratory should be explained by a long analysis circuit described in picture 1, and also in Madagascar as in other countries laboratories did not manage with pneumatic transport system for routing samples [6]. Yet the transport of samples by pneumatic conveyance reduced the transit time considerably [7]. Furthermore the transport of samples and the delivery of the results were often ensured by the patients guards who had received no training on the importance of different steps of analysis [8].

Concerning the post-analytic stage, the use of concentrator analyzers using the rules of technical validation reduced indeed allowed to free the technical stage while securing the validation [7]. Our laboratory does not have either this device. In our case, the lack of custodial staff increases the delivery time of the analysis at the laboratory. According to some authors, taking into account the human factor has not been left and increasing the staff number allows to improve the delivery period of the results [9]. About the delivery time of the analysis, it is obvious that nowadays technical progress make improvements at laboratories of biological analysis [10]. The extreme values, varying between 54 and 723 minutes, reflected a big heterogeneity of the requests: the numbers of requests, the requesting services, requested parameters, etc. The analyses which were carried out on BS300 were done more rapidly according to requested parameters. It is in the opposite of the troponin test carried out on VIDAS. The study of period fractions had shown a very long delay of prescription. Sometimes after the prescription of the test by the doctor there is a long period of waiting before the arrival at the payment service, it is either because of a lack of money to carry out the test, or because the nurse was still attending other tasks before passing the check up which should be done to the person who was looking for the patient. Most of the analyses requests included 1 to 4 biochemical parameters, 3 parameters per request was the average number. These parameters were mostly composed of the association of the blood electrolytes – uremia - creatininemia. These parameters cost < 6,47 \$ and the delivery time of these parameters on the automaton was short and this fact explained the results we have got (Picture 2).

CONCLUSION

It is important to calculate the turnaround time of analyses results . They could be used as inner quality indicators by a regular check up [3, 11] or in the case of a contract of objectives with the care services and the emergency unit [7]. This study revealed a high delivery period of the results compared to other studies, mainly as far as the prescription period was concerned. Many sources of the delay were identified in this study. Several tools could improve the delivery period of the results such as automation of the pre and post-analytic stages within the laboratories of medical biology like in developed countries, and the raise of the staff number at the care unit and at the laboratories service.

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